

ORIGINAL RESEARCH

Nonmedical Factors Associated with Prolonged Hospital Length of Stay in an Urban Homebound Population

Dinah Foer, BA^{1,2}, Katherine Ornstein, PhD, MPH², Theresa A. Soriano, MD, MPH²,
Navneet Kathuria, MD, MPH, MBA³, Andrew Dunn, MD⁴

¹Yale University School of Medicine, New Haven, Connecticut; ²Mount Sinai Visiting Doctors Program, The Mount Sinai Hospital, New York, New York; ³Baylor College of Medicine, Houston, Texas; ⁴Mount Sinai Department of Medicine, The Mount Sinai Hospital, New York, New York.

BACKGROUND: Prolonged length of stay (LOS) is a major concern for hospitalized populations at risk for adverse events. Homebound patients are at particular risk for long stays and may have unique discharge needs because of their commitment to be cared for at home despite poor functional status.

OBJECTIVE: The goal of this study was to describe factors contributing to long hospitalizations in the homebound population.

DESIGN: This retrospective observational pilot study included all 2007 discharges that occurred for patients at The Mount Sinai Hospital enrolled in the Mount Sinai Visiting Doctors Program.

MEASURES: Long-stay patients were defined as those having an LOS 2 standard deviations above the mean. Hospitalization days were defined as “nonmedical” when patients medically ready for discharge remained in the hospital. Patients discharged immediately after determination

of medical readiness were characterized as “medical stay” cases. The University HealthSystems Consortium Database was used to calculate expected LOS and the LOS ratio. Chart reviews were performed to describe long-stay cases as nonmedical or medical.

RESULTS: The average LOS for 479 discharges was 7.84 days, with a mean LOS Ratio of 1.23. Seventeen cases were determined to be long stays. Eight of these cases (47%) were defined as nonmedical stays. These accounted for 136 days of hospitalization and 32% of total long-stay days. The most common reason for a nonmedical stay was nursing facility placement delay.

CONCLUSIONS: Nonmedical factors accounted for nearly one-third of all long-stay days in the hospitalized homebound population. Increased interdisciplinary collaboration may help address homebound patient LOS. *Journal of Hospital Medicine* 2012;7:73–78. © 2011 Society of Hospital Medicine

In recent years, much attention has been paid to concerns regarding length of stay (LOS) and safety of hospital discharges.^{1–3} Yet studies conducted in a variety of populations suggest that long stays do not wholly reflect acute medical necessity, but may also be driven by nonmedical factors.^{4–6} In a study of frail elderly patients, nonmedical factors accounted for over half of patients’ hospital stay days.⁵ Nonmedical factors may include the availability of community and outpatient resources, inadequate patient social support, disagreement with family and/or patient decision-making, and post-hospital placement and care needs.⁷

Homebound patients are at particular risk for long stays because they are typically frail, elderly, and medically complex.⁸ The United States homebound popu-

lation numbers at least 2 million and is expected to increase to at least 3 million by the year 2020.⁹ This group is medically underserved, often only receiving care for medical emergencies, and represents a costly group of health care beneficiaries.¹⁰ Although homebound primary care (HBPC) programs are structured to provide coordinated medical and supportive care in the home, the clinical complexity of patients often requires hospitalization during times of acute illness.¹¹

Navigating the discharge process for homebound patients can prove time-consuming for inpatient physicians whose clinical obligations encompass ensuring safe care transitions between hospital and home.¹² The lack of literature on the discharge needs of the homebound population provides little guidance for physicians and health systems seeking to safely transition homebound patients from the hospital to the home in a timely and efficient manner. We performed a pilot study of an urban homebound population cared for by a single academic homebound program to identify and describe nonmedical factors associated with prolonged hospitalization.

METHODS

This retrospective descriptive study included homebound patients cared for by The Mount Sinai Visiting

*Address for correspondence and reprint requests: Dinah Foer, Mount Sinai Visiting Doctors Program, The Mount Sinai Hospital, Box 1216, 17 East 102nd Street, New York, NY 10029; Tel.: 212-241-4141; E-mail: dinah.foer@yale.edu

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Doctors Program (MSVD), a primary care program affiliated with The Mount Sinai Hospital. MSVD is the largest academic homebound primary care program in the United States. The structure and patient population of MSVD patients have been described previously.¹³ Briefly, the program employs 8 physicians, 2 nurse practitioners, and support personnel including 2 registered nurses, 4 social workers, and 4 clerical staff members to serve over 1000 homebound patients annually. To be enrolled in the program, patients must meet the Medicare definition of homebound (ie, they must be able to leave home only with great difficulty and for infrequent or short absences). Patients are referred from a variety of sources including emergency rooms, inpatient units, and local nursing and social service agencies. Physicians visit patients on average once every 2 months, but can make more frequent home visits when a clinical need arises. Thirty-six percent of patients in the program are hospitalized at least once per year while they are under the MSVD's care.¹⁴ Patients in the MSVD are referred by their primary care physician to outpatient social work as needed for finite interventions, though not for ongoing case management; approximately one-third of all MSVD patients have been seen by an MSVD social worker over a 1-year period.¹⁴

All patients enrolled in MSVD discharged from The Mount Sinai Hospital in New York from January 1, 2007, to December 31, 2007, were evaluated for inclusion in this study. The MSVD clinical database was cross-referenced with The Mount Sinai Hospital data system to maximize reliability of recorded admission and discharge dates. Discrepancies in dates were investigated and corrected by the authors. As the study focused on admissions rather than individual patients, repeat hospitalizations and factors contributing to long stays were included and considered separately. In the event of repeat hospitalizations, factors contributing to LOS were also assessed separately.

Using the University HealthSystems Consortium (UHC) Database, the selected discharges were analyzed for LOS data. The UHC Database contains data from The Mount Sinai Hospital and 106 other academic medical centers and 233 other affiliated hospitals, representing approximately 90% of the United States' nonprofit academic medical centers. UHC members submit clinical, financial, and administrative information for the purpose of facilitating comparative data analysis among institutions.¹⁵ The model assigns an expected LOS for each patient based on a 4-step risk adjustment methodology that adjusts for variations in patient characteristics. The regression models consider a range of independent variables including patient age, sex, race, socioeconomic status, admission source, and comorbid conditions. The expected LOS value is used to produce an LOS ratio, which is the ratio of a patient's observed LOS to expected LOS. We compared LOS ratios for all

patient discharges during the study period and determined the mean LOS ratio for the group. Long-stay patients were defined using the UHC definition of an LOS ratio greater than 2 standard deviations above the mean. These patients were selected for analysis to examine factors contributing to their long stays.

The primary author conducted a chart review for the long-stay patients. The date of medical readiness for discharge was defined as the date when no acute hospital care needs or pending procedures (eg, intravenous medication, transfusion, invasive and noninvasive testing, surgery) were documented by the attending physician, house officer, nurse practitioner, or physician assistant in the chart. Patients with a discharge immediately following determination of medical readiness were characterized as having a "medical stay" (eg, patient admitted for pneumonia and discharged home after 3 days once fever, leukocytosis, and symptoms improved with a prescription for remaining antibiotic course). Patients who were classified as medically ready for discharge yet remained additional days in the hospital were categorized as having a nonmedical component to their hospitalization and comprised the "nonmedical stay" group (eg, patient admitted for pneumonia with improved vital signs and symptoms after 3 days, but discharged home after 10 days awaiting approval of increased home health aide hours). The primary author reviewed cases (<5%) with coauthors when categorization of patient data was unclear from physician documentation in the patient's chart. Similar methodology and terminology have been used in previous studies examining the contribution of nonmedical factors to LOS.^{5,7}

While literature in other fields, such as social work, often characterize similar factors as "social" or "social care" factors, we use the term "nonmedical" to draw the distinction between factors that acutely reflect a patient's state of health and necessitate days spent in the hospital (eg, surgery, infection), in contrast to factors that are not direct contributors to the patient's current medical status (eg, post-hospital placement). Factors contributing to nonmedical days were determined based on previous studies and categorized as follows: nursing facility bed availability, nursing facility rejection of the patient, complications with insurance coverage, lack of patient/family agreement with discharge plan, home care service delays, and other. The category "other" was included to identify and explore any unexpected or unique reasons for prolongation of hospitalization in this population. When multiple nonmedical factors were identified for a given hospitalization, all contributing factors were recorded.

Demographic, clinical, and discharge characteristics were extracted from the MSVD clinical database to qualitatively describe and compare the long-stay hospitalizations to the remainder of the sample.

TABLE 1. Demographic, Clinical, and Discharge Characteristics for 2007 Hospitalizations According to Length of Stay

| Characteristics* | Non-Long-Stay Patients (n = 462) | Long-Stay Patients (n = 17) |
|------------------------|----------------------------------|-----------------------------|
| Mean age, years (SD) | 80 (15.6) | 74 (18.2) |
| Female sex | 69% | 47% |
| Race | | |
| Caucasian | 27.1% | 29% |
| Black | 31.4% | 23.5% |
| Hispanic | 37.7% | 41.2% |
| Other | 2.4% | 5.9% |
| Has Medicaid | 68.1% | 70.6% |
| Dementia diagnosis | 42.9% | 29.4% |
| Depression diagnosis | 37.3% | 47.1% |
| Lives alone | 39.8% | 43.8% |
| Discharge | | |
| Nursing/rehabilitation | 14.9% | 35.3% |
| Home | 78.3% | 64.7% |
| Death | 5.9% | 0% |
| Hospice | 0.9% | 0% |

NOTE: Characteristics describe all hospitalizations and include multiple discharges per patient. Abbreviation: SD, standard deviation.

RESULTS

There were a total of 479 discharges of 267 unique MSVD patients from The Mount Sinai Hospital occurring from January 1, 2007, to December 31, 2007. During this 12-month period, the average observed LOS for all admissions was 7.84 days, with a mean UHC LOS ratio of 1.23 (SD = 3.43). Seventeen admissions were identified as long-stays, representing 3.5% of discharges. The 17 admissions represent 17 unique patients.

As shown in Table 1, the long-stay group (n = 17) was slightly younger, more likely to be male, and had less dementia than the non-long-stay group (n = 462). There was a marked difference in the location of patient discharge; long-stay patients were more than twice as likely to be discharged to a facility and less likely to be discharged home. There were no in-hospital deaths in the long-stay patient group during the time period studied.

Of the 17 long-stay patients, 8 (47%) remained in the hospital past the date they were determined to be medically ready for discharge and were defined as having a nonmedical component for the extension of their hospitalizations. The number of nonmedical days ranged from 6 to 34 days (mean, 17 days). Out of 428 total long-stay patient days, 136 were nonmedical. This represented 31.8% of all long-stay patient days, and 53% of the nonmedical group's total hospital days. The mean LOS ratio for the nonmedical cases was 6.04 (Table 2).

Nine patients were defined as medical stay cases (ie, no nonmedical component contributing to the long hospitalization). The mean observed LOS was 19.2 days, and the mean LOS ratio for this group was 5.07 (Table 2). There were no significant differences

TABLE 2. Medical Stay and Nonmedical Stay Length of Stay Ratios

| | Medical Stay (n = 9) | Nonmedical Stay (n = 8) |
|------------|----------------------|-------------------------|
| LOS (days) | 19.2 | 17 |
| LOS ratio | 5.07 | 6.04 |

Abbreviation: LOS, length of stay.

between primary diagnosis-related groups (DRGs) seen in the medical and nonmedical stay groups.

The most common reason for a nonmedical stay was nursing facility placement delays (Table 3), specifically related to lack of bed availability and facility rejection of the patient leading to prolonged time waiting for long-term placement (n = 6). Other nonmedical factors contributing to LOS were lack of patient and/or family agreement with discharge plans (eg, disagreement among family members regarding caregiving responsibilities, goals of care, or patient refusal to be discharged on a particular day) (n = 4); complications with insurance coverage for facility placement or for home care (n = 3); and home care service delays, such as patient need for increased home care hours after discharge (n = 2). Of note, 5 of the 8 nonmedical stay cases had multiple factors contributing to patients' long stays. All delays were assigned to one of the a priori defined categories. There were no other or unexpected reasons identified.

Of the nonmedical cases, all but 1 patient had been seen by an MSVD social worker prior to hospital admission, though the social work referral may have been years prior to or unrelated to the current admission.

DISCUSSION

Almost half of long-stay patients identified in this homebound population remained hospitalized in an urban academic medical center due to at least one, and often multiple, nonmedical factors. Nonmedical factors identified in this group are similar to those described in previous studies, particularly family and patient decision-making and post-hospital placement and care needs.^{5,7} Although this pilot study was limited to a single-site population, it is to our knowledge the first study to describe these factors in a homebound population, and may be able to guide future research and discussion on this topic.

This study used a risk-adjusted LOS measure to determine long stay cases. Using the UHC Database allowed for a more accurate understanding of the contribution of nonmedical factors to LOS by accounting for hospitalizations that were numerically lengthy but medically appropriate for their respective DRG. The use of the LOS ratio also allows for standardized application of these data across academic health centers. In our sample, 50% of the patients classified as LOS outliers by the UHC Database (cases with LOS

TABLE 3. Characteristics of Nonmedical Long-Stay Patients

| Patient | Demographics | Expected LOS (days) | Observed LOS (days) | LOS Ratio | No. of Nonmedical Days | Nonmedical Stay Factors |
|-----------|----------------------------------|---------------------|---------------------|-----------|------------------------|---|
| Patient A | 63-year-old white man | 4.56 | 48 | 10.53 | 34 | Nursing facility bed availability Lack of patient/family agreement with discharge plan |
| Patient B | 53-year-old white man | 2.97 | 31 | 10.44 | 23 | Nursing facility rejection of the patient Lack of patient/family agreement with discharge plan Complications with insurance coverage |
| Patient C | 98-year-old Latina woman | 5.51 | 29 | 5.26 | 23 | Home care service delays Lack of patient/family agreement with discharge plan Home care service delays Complications with insurance coverage |
| Patient D | 83-year-old white woman | 8.94 | 46 | 5.15 | 13 | Nursing facility bed availability |
| Patient E | 93-year-old white woman | 9.05 | 42 | 4.64 | 16 | Nursing facility bed availability |
| Patient F | 87-year-old Latino man | 2.62 | 11 | 4.20 | 6 | Nursing facility bed availability Nursing facility rejection of the patient Complications with insurance coverage |
| Patient G | 55-year-old white man | 5.66 | 23 | 4.06 | 7 | Lack of patient/family agreement with discharge plan |
| Patient H | 40-year-old African American man | 6.23 | 25 | 4.01 | 14 | Nursing facility rejection of the patient Nursing facility bed availability |

Abbreviation: LOS, length of stay.

in the top percentile for their respective DRG) had nonmedical stays. Conventional strategies often dismiss outliers in analyses of patient LOS data. However, in doing so there is a missed opportunity to identify underlying reasons for their disproportionately long hospitalizations that may also be impacting the broader set of patients with similar nonmedical factors affecting LOS.

The 8 nonmedical stay patients spent a combined 136 days longer in the hospital than medically necessary due to a variety of nonmedical factors, and represented over half of the nonmedical stay group's total hospital days. Using a conservative estimate for cost per hospital day of \$1770,¹⁶ the nonmedical days cost the hospital almost a quarter of a million dollars (\$240,720). Because this figure only accounts for long-stay patients, the actual costs attributable to nonmedical days for the homebound population in general may be higher.

The longest patient stays, whether attributable to medical or nonmedical factors, were more likely to result in discharge to a facility than the rest of the sample hospitalizations. Facility placement was the most common nonmedical factor contributing to long stays in this sample. In contrast, home care-related factors contributed the least to nonmedical days. This finding highlights the need for hospital-based physicians and other inpatient staff members to be aware that despite patient enrollment in an HBPC, the possibility for homebound patients to be discharged to a nursing facility remains significant. A decreasing number of skilled nursing beds across the United States may magnify this factor in long-stay cases.¹⁷ Increased awareness of this possibility among inpatient staff can allow the team to address facility placement considerations early in the hospital stay, potentially decreasing nonmedical days.¹⁸

Seven of the 8 nonmedical stay patients had been referred to and seen by MSVD social workers before hospitalization, a high percentage relative to the general MSVD population, of which fewer than half are seen by a social worker during their enrollment in MSVD. This finding may suggest that this group of patients already exhibited difficult social circumstances before their hospital admission, yet the current referral-based social work model at MSVD did not mitigate their high LOS. This finding further suggests that patient enrollment in an HBPC does not mitigate the risk of high LOS and prolonged nonmedical stays, and that involvement of inpatient practitioners remains a critical part of advanced discharge planning.

This pilot study found that 32% of all long-stay hospital days were due to nonmedical factors, suggesting that these factors play a greater role in the homebound population than for general medical patients. A recent study at an academic medical center examined 3574 patient-days on a general medicine service, and noted that 11% of all days were felt to be medically unnecessary by the treating hospitalists.¹⁹ Hospitalists are well situated to participate in and lead improvement efforts given their expertise in managing complex dispositions and advancing collaborative strategies for care of patients with high overall acuity.²⁰ These efforts will be needed to target those patients at highest risk for prolonged LOS with the greatest social care needs. Because this study did not pilot strategies to reduce LOS, we cannot offer evidence-based suggestions for an enhanced multidisciplinary approach or other avenues for improvement. However, we believe that the study findings provide the basis for future research to test strategies to reduce excess LOS by focusing on nonmedical factors and a multidisciplinary approach. This will become especially relevant as

health care systems bear increasing financial responsibility for inefficient and/or unnecessary hospitalizations and readmissions.

The involvement of social work before hospitalization for most of the homebound population with prolonged hospitalization suggests a need for greater team-based efforts across venues. Though hospital interdisciplinary rounds aim to increase collaboration and reduce LOS, costs, and readmissions, these rounds do not typically include outpatient care providers.²¹ Improved communication and collaboration between social work with both inpatient and outpatient care teams to address nonmedical issues contributing to long stays are likely to improve care and transitions, though rigorous studies examining specific communication models across venues are lacking. This study found that delay in nursing facility placement was the most common reason for prolonged hospitalization for long-stay cases. This finding emphasizes the need for communication between inpatient and outpatient staff to convey prior conversations or preparations for placement, identify patients who need post-discharge facility placement early in hospitalization, and prompt timely discussions with patients and families.

The finding that prolonged hospitalization for the homebound population was due to nonmedical factors for almost one-half of patients with long hospital stays has important implications for policymakers and other key stakeholders. For example, accountable care organizations are being developed to align members of the health care sector to provide higher quality care in a more efficient manner. These study data suggest that this alignment should include hospitals, nursing homes, and home health care agencies to ensure that discharge delays are minimized and unnecessary societal costs are avoided. Future research will need to confirm and build upon these findings of nonmedical reasons for excessive LOS to further inform the process of implementation of health care reform measures. Recent plans to cut Medicaid funding to nursing homes may further limit bed availability, increasing the risk of prolonged LOS and related costs to the health care system. This potential concern highlights the importance of care coordination and communication between inpatient and outpatient care providers to proactively address nursing home placement needs before hospitalization occurs, and/or to identify alternative safe discharge plans if a previously homebound patient is hospitalized.

There are several limitations to this descriptive study. Admissions included in this analysis were only captured for those admitted to The Mount Sinai Hospital. While MSVD providers report that more than 90% of hospitalizations for MSVD patients occur at The Mount Sinai Hospital, patients may also be admitted to one of many New York City metropolitan area hospitals closer to the patient's residence. It is possible that additional factors contributing to high

LOS might be revealed if these admissions were included in the analysis. The urban homebound population served by MSVD may have more access to supplementary home care services (e.g. home attendants, meal services) than populations in more rural and less service-intensive areas. Thus, it may be difficult to generalize these findings to programs serving less urban constituencies or with more restrictive policies regarding home care services. Additionally, as New York registers one of the highest nursing facility occupancy rates (in 2008, 92.2% versus the national average of 82.9%), patients in other markets may face a shorter wait time for a bed, decreasing the number of nonmedical days attributable to nursing home bed supply.¹⁷ The small total number of long-stay patients also prevented statistical analysis comparing those patients with the rest of the sample. This pilot study may inform the design of future studies that may be able to include multiple HBPC programs or study homebound patients over a longer period to increase sample size.

Identifying the significant contribution of nonmedical days to patient stay is an important initial step to avoiding costly and medically unnecessary days for the patient and the hospital. As has been demonstrated in other interdisciplinary efforts, increased collaboration among physicians, social workers, discharge planners, and other disciplines may help address current gaps in patient care with regard to LOS.^{20,21} Future studies should determine which homebound patients are at highest risk for prolonged hospitalization due to nonmedical factors to help design focused strategies and interventions for this vulnerable population.

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